KNOWLEDGE

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The workers have nothing to lose in this [revolution] but their chains. They have a world to gain. Workers of the world, unite!

Karl Marx, **The Communist Manifesto** (1848)

Once more unto the breach, dear friends, once more;
Or close the wall up with our English dead!

William Shakespeare, Henry V III. i.

Let us therefore brace ourselves to our duties, and so bear ourselves that, if the British Empire and its Commonwealth last for a thousand years, men will still say: 'This was their finest hour.'

Winston Churchill, Speech, House of Commons, 18th June 1940

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Q QUOTATIONS (part two)

Marx, Karl
(1818–1883)

From each according to his abilities, to each according to his needs. *Criticism of the Gotha programme.*
Religion . . . is the opium of the people.
Kritik der Hegelschen Rechtsphilosophie.

Mary Tudor (1516–1558)
When I am dead and opened, you shall find 'Calais' lying in my heart. Holinshed, *Chron.*

Masefield, John (1878–)
I must down to the seas again, to the lonely sea and the sky,
And all I ask is a tall ship and a star to steer her by,
And the wheel's kick and the wind's song and the white sail's shaking,
And a grey mist on the sea's face and a grey dawn breaking. *Sea Fever.*

Prince Metternich (1773–1859)
Italy is a geographical expression. *Letter*, 1849.

Mill, John Stuart (1806–1873)
If all mankind minus one, were of one opinion, and only one person were of the contrary opinion, mankind would be no more justified in silencing that one person, than he, if he had the power, would be justified in silencing mankind. *Liberty.*

Milne, Alan Alexander (1882–1956)
They're changing guard at Buckingham Palace –
Christopher Robin went down with Alice.
When We Were Very Young. Buckingham Palace.
I do like a little bit of butter to my bread!
Ib. The King's Breakfast.
Little Boy kneels at the foot of the bed,
Droops on the little hands, little gold head;
Hush! Hush! Whisper who dares!
Christopher Robin is saying his prayers. *Ib. Vespers.*

Milton, John (1608–1674)

Sabrina fair,
Listen where thou art sitting
Under the glassy, cool, translucent wave,
In twisted braids of lilies knitting
The loose train of thy amber-dropping hair. *Comus.*
At last he rose, and twitch'd his mantle blue;
To-morrow to fresh woods, and pastures new. *Lycidas.*
What in me is dark
Illumine, what is low raise and support;
That to the highth of this great argument
I may assert eternal Providence,
And justify the ways of God to Men. *Paradise Lost.*
Here we may reign secure, and in my choice
To reign is worth ambition though in hell:
Better to reign in hell, than serve in heav'n. *Ib.*
Who overcomes
By force, hath overcome but half his foe. *Ib.*
A heaven on earth. *Ib.*
They also serve who only stand and wait.
Sonnet. On His Blindness.

Molière (Jean Baptiste Poquelin; 1622–1673)
One should eat to live, not live to eat. *L'Avare.*

Moore, Edward (1712–1757)
This is adding insult to injuries. *The Foundling.*
I am rich beyond the dreams of avarice. *The Gamester.*

Mordaunt, Thomas Osbert (1730–1809)
Sound, sound the clarion, fill the fife,
Throughout the sensual world proclaim,
One crowded hour of glorious life
Is worth an age without a name. *The Bee.*

More, Sir Thomas (1478–1535)
I pray you, master Lieutenant, see me safe up, and my coming down let me shift for my self. [On mounting the scaffold.] Roper, *Life of Sir Thomas More.*

Morell, Thomas (1703–1784)
See, the conquering hero comes!
Sound the trumpets, beat the drums! *Joshua.*

Napoleon I (1769–1821)
England is a nation of shopkeepers. *Attr.*
Every French soldier carries in his cartridge-pouch the baton of a marshal of France.
Blaze, *La Vie Militaire sous l'Empire.*

Nelson, Horatio, Viscount (1758–1805)
I have only one eye, – I have a right to be blind sometimes: . . . I really do not see the signal!
At the battle of Copenhagen.
England expects that every man will do his duty.
At the battle of Trafalgar.
Thank God, I have done my duty. *Ib.*

Nicholas I of Russia (1796–1855)
We have on our hands a sick man – a very sick man.
Of Turkey.

North, Christopher (1785–1854)
His Majesty's dominions, on which the sun never sets.
Noctes Ambrosianae No. 20.

Orczy, Baroness (1865–1947)
We seek him here, we seek him there,
Those Frenchies seek him everywhere.
Is he in heaven? – Is he in hell?
That demmed, elusive Pimpernel?
The Scarlet Pimpernel.

Orwell, George (1903–1950)
All animals are equal, but some animals are more equal than others. *Animal Farm.*

Palmerston, Henry John Temple, Viscount (1784–1865)
. . . as the Roman in the days of old held himself free from indignity when he could say *civis Romanus sum*, so also a British subject in whatever land he may be shall feel confident that the watchful eye and the strong arm of England will protect him against injustice and wrong. *Speech*, 1850.

Peacock, Thomas Love (1785–1866)
The mountain sheep are sweeter,
But the valley sheep are fatter;
We therefore deemed it meeter
To carry off the latter. *War-Song of Dinas Vawr.*

Pepys, Samuel (1633–1703)
And so to bed. *Diary*, 1660.

Pitt, William (The Younger) (1759–1806)
Roll up that map; it will not be wanted these ten years.
On a map of Europe, after the battle of Austerlitz. Attr. last words.

Pliny (A D 23–79)
In vino veritas. (Truth comes out in wine.)

Poe, Edgar Allan (1809–1849)
On desperate seas long wont to roam,
Thy hyacinth hair, thy classic face,
Thy Naiad airs have brought me home
To the glory that was Greece
And the grandeur that was Rome. *To Helen.*

Pomfret, John (1667–1703)
We live and learn, but not the wiser grow. *Reason.*

Pompadour, Madame de (1721–1764)
Après nous le déluge. (After us the deluge.) *Mémoires.*

Pope, Alexander (1688–1744)

A little learning is a dang'rous thing;
Drink deep, or taste not the Pierian spring:
There shallow draughts intoxicate the brain,
And drinking largely sobers us again. *Essay on Criticism.*
To err is human, to forgive, divine. *Ib.*
For fools rush in where angels fear to tread. *Ib.*
Know then thyself, presume not God to scan,
The proper study of mankind is man. *Essay on Man.*
Hope springs eternal in the human breast;
Man never is, but always to be blessed. *Ib.*

The Book of Common Prayer
We have erred, and strayed from thy ways like lost sheep. *General Confession.*
Hear them, read, mark, learn, and inwardly digest them.
Collects, 2nd Sunday in Advent.
The author and giver of all good things.
Ib., 7th Sunday after Trinity.
Let him now speak, or else hereafter for ever hold his peace. *Solemnization of Matrimony.*

Punch
Go directly – see what she's doing, and tell her she mustn't. 1872.
Feed the brute! 1886.
I'm afraid you've got a bad egg, Mr Jones. (Bishop.)
Oh no, my Lord, I assure you! Parts of it are excellent! (Curate.) 1895.

Putnam, Israel (1718–1790)
Men, you are all marksmen – don't one of you fire until you see the whites of their eyes. *Bunker Hill*, 1775.

Rabelais, François (1494?–1553)
Ring down the curtain, the farce is over.
Attr. death-bed remark.

Raleigh, Sir Walter (1552?–1618)
Fain would I climb, yet fear I to fall.
Line Written on a Window Pane. [Finished by Queen Elizabeth, 'If thy heart fails thee, climb not at all.']

Rhodes, Cecil John (1853–1902)
So little done, so much to do. *Last words.*

Ridding, George (1828–1904)
I feel a feeling which I feel you all feel. *Sermon*, 1885.

Rochester, John Wilmot, Earl of (1647–1680)
Here lies a great and mighty king
Whose promise none relies on;
He never said a foolish thing,
Nor ever did a wise one. *The King's Epitaph.*

Previous page: Great words are associated with great actions. Marx's call for the workers of the world to unite echoed through the Bolshevik Revolution of 1917; Churchill's great speeches inspired Britain in her finest hour during the Second World War; and Shakespeare's famous lines from *Henry V* are as applicable to the 1944 invasion of France as they were to Henry V's invasion in the 15th century.
The pictures show: (*top*) a Bolshevik parade in Red Square at the time of the Revolution; (*bottom*) fighter pilots scrambling to their planes in the Battle of Britain; and (*centre*) British troops going into action on D-Day (1944).

A group of red kangaroos in the Australian bush. The one in the foreground is a mother with a baby in her pouch

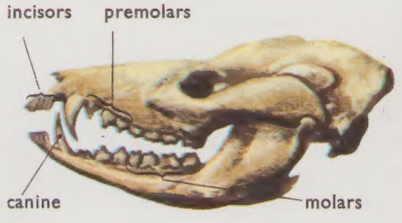
THE MARSUPIALS

IF you were asked: 'What is the animal that has a pouch on its tummy and carries its baby about in it?' you would reply, without hesitation: 'The kangaroo'. This would be a correct answer, but not a complete one, for there are many other mammals that bring up their young in this way. They form the Order called the **Marsupialia**, and differ from the placental mammals (which are the familiar types like horses, dogs, mice, and men) in various anatomical details; it is especially characteristic of the marsupials that their young are born at a very early, embryonic stage of development.

AS BIG AS A MAN
AS SMALL AS A MOUSE
The red kangaroo (Macropus rufus) stands between 6 and 7 feet tall
9 feet
6 feet 6 inches
4 feet
3 inches
The shrew opossum (Monodelphus) is only 3 inches long

We can regard the two marsupials illustrated above – the red kangaroo and the shrew opossum – as the giant and the dwarf of the Order, as far as living species are concerned. Formerly, however, there were much larger ones. When the aboriginal people first arrived in Australia, some time during the last 20,000 years, there was a huge beast living there, of which many fossil skeletons have been found. It was as big as a rhinoceros and may have looked rather like one, but it was a marsupial, and has been given the name *Diprotodon*.

In many respects marsupials are primitive; for instance, they always have a full set of teeth, with incisors, canines, premolars, and molars all present.



The presence of a full set of teeth in mammals is regarded by zoologists as 'primitive'

The most characteristic feature of the marsupials, and the chief difference between them and placental mammals, is the way in which the young are born when they are still small embryos. The newly-born young of a 6-foot kangaroo is just over 1 inch long. Naturally such tiny, undeveloped 'babies' require complete protection after birth, and the pouch or *marsupium* of the mother has been developed to provide this.

Hind foot of a kangaroo

In kangaroos and Australian opossums the opening of the pouch is directed forwards, but it opens backwards in most other marsupials. Some of the smaller rat- and mouse-like species have no pouches, and the young simply remain attached to the teats of the mother by their mouths until they are sufficiently developed to hang on to her fur with their feet.

Where they live

The marsupials are now confined to Australasia, and to South and Central America, though one species extends into the northern United States. During the Tertiary period, however, they were much more widely distributed.

Red kangaroo (*Macropus rufus*). This is the largest of all the kangaroos, and the largest living marsupial, though the great grey kangaroo is nearly as big. When a red kangaroo stands upright it is between 6 and 7 feet tall. This animal is found over most of Australia, but its numbers are constantly being reduced because, since it feeds on grass, it is regarded as a pest by sheep farmers. Thousands of kangaroos are killed every year, and fences are put up to keep them away from the best grazing. The young of this big animal are just over an inch long when they are born. At six months old the baby begins to put its head out of its mother's pouch and look around, and it starts to venture out of the pouch at about eight months.

Marsupial mole (*Notoryctes typhlops*). Since this animal is a marsupial it is, of course, in no way related to the true moles. It has, however, come to look like them as a result of its similar way of life. It has yellowish fur, a horny muzzle, and powerful claws on its fore-feet, by means of which it burrows through the earth. It lives in dry, sandy regions.

Representative marsupials from Australia and America; some

Thylacine or **Tasmanian wolf** (*Thylacinus cynocephalus*). The thylacine is the largest carnivorous marsupial, and looks rather like a dog or a wolf. It was formerly common in Tasmania, but when the European settlers started sheep-farming there the 'wolves' preyed on the sheep, and the farmers naturally did their best to exterminate them. Now the thylacine is so rare that it has not been seen for many years, but recently its tracks have been found in the wilder parts of Tasmania, and it is believed that it survives there in small numbers.

Tasmanian devil (*Sarcophilus harrisii*). This is another carnivorous marsupial that is found only in Tasmania. It is about as big as a large cat and very strong for its size, but its reputation for fierceness is exaggerated. The pouch of this species and of the thylacine opens backwards.

Koala (*Phascolarctos cinereus*). We have described a marsupial 'mole' and 'wolf', now here is a marsupial 'bear'. This animal, found in Australia, looks more like a toy teddy bear than a real one. It lives among the branches of eucalyptus trees, feeding on the leaves which are the only food it will eat. At one time it was mercilessly hunted for its fur, but it is now protected. Forest fires and destruction of trees have also tended to reduce its numbers.

Marsupials of the American continent

Water opossum (*Chironectes minimus*). This is the only marsupial that is adapted for swimming; it might well be called a 'marsupial otter'. The water opossum is found in tropical America, from Guatemala southwards to Brazil. It has a long, naked, scaly tail, and its feet are webbed. Although it is carnivorous, feeding on fish and other aquatic creatures, it has cheek-pouches; these are characteristic of vegetable feeders, like hamsters, but no other carnivorous mammal possesses them. It is hard to see how the mother can go swimming while her young are in her pouch, but it is not known for certain whether she really stays on land for the whole time that she carries them.

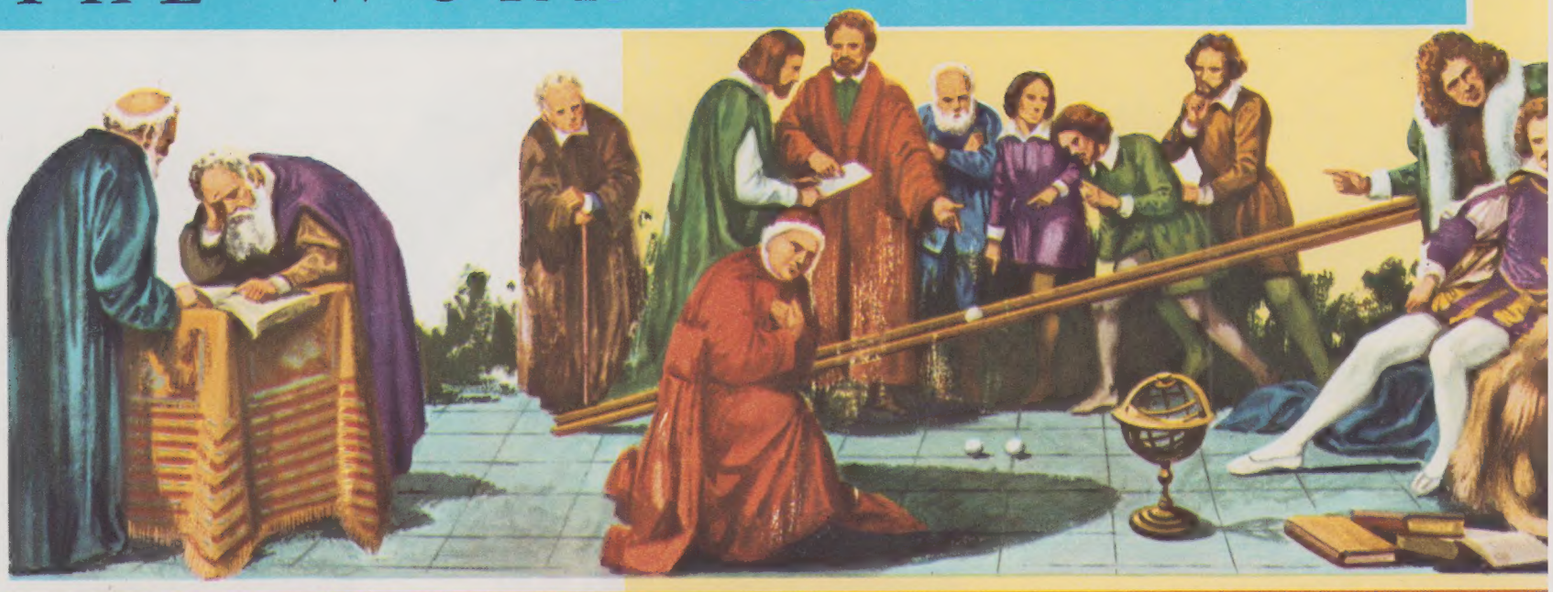
Four-eyed opossum (*Metachirus nudicaudatus*). This opossum has been given its rather strange name on account of the conspicuous white spot above each eye. It is about the size of a rat, and its tail is prehensile and furry only at the base. When the young leave the pouch they climb on their mother's back, and sometimes hold on by curling their tails round hers.

are herbivorous and some are carnivorous. For the sake of convenience they are all placed in one landscape

Woolly opossum (*Caluromys philander*). This pretty little marsupial lives in trees, climbing about with the help of its prehensile tail which is longer than its head and body combined and can be curled round twigs and branches. It eats fruit and insects.

American or **Virginian opossum** (*Didelphys virginiana*). This is the only marsupial found widely in North America – from Mexico to the northern United States. It is about the size of a cat, and is nocturnal and an expert climber, preferring to live in wooded country. It will eat almost anything: fruit, eggs, insects, small birds, and mammals, and sometimes domestic poultry. Opossums may give birth to as many as 18 young, but when such large litters are born some are usually abandoned at once, and the number to come to maturity is seldom more than half-a-dozen. The Virginian opossum was almost certainly the first marsupial ever to be seen by Europeans.

THE WORK OF GALILEO



The great Renaissance scientist, Galileo Galilei (in the centre with index finger on a paper), demonstrates the effects of gravity on bronze balls rolling down a long inclined

DROPPING two weights over the parapet of the leaning tower of Pisa was a highly unusual and somewhat dangerous pursuit, and a large group of students and teachers gathered near the foot of the tower to watch the new professor of mathematics perform this feat. The year was 1589, and the new professor was a young man of 25 – Galileo Galilei (see page 625).

Carrying a 1-pound shot and a 10-pound shot, the professor climbed the tower, and when he reached a suitable height on the overhanging side he placed the shots on the parapet. Then, simultaneously, he pushed the two shots over the edge so that they fell rapidly earthwards. Both hit the ground at exactly the same moment. Most of the onlookers by the tower, however, remained unconvinced by this demonstration of the theory that bodies falling from the same height do so in equal times despite differences in their weights. In fact most of them found the experiment completely meaningless, so steeped were they in Aristotle's theory that heavy weights fall faster than light ones. Worse still, the experiment earned Galileo many new and powerful enemies.

Further experiments with gravity

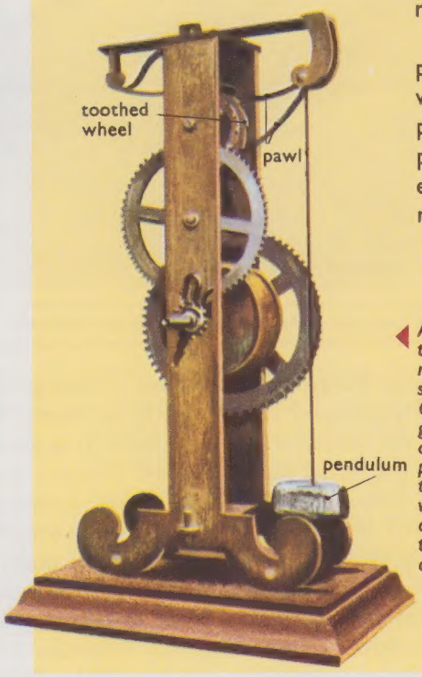
Galileo later extended his experiments with gravity by investigating the times taken by bronze balls to roll down a sloping wooden channel, like the one shown in our illustration. In this way he was able to prolong, and thus measure more accurately, the time taken by bodies to reach the ground. But even after this he was unable to convince more than a handful of his contemporaries that his views, rather than those of Aristotle, provided the true account of the mystery of gravitation.

The pendulum

Galileo was only 17 when, in 1581, he made his first important discovery (see page 636). While in the cathedral at Pisa he noticed that when the attendant lit the great hanging lamp in the nave he always drew it a little to one side. Consequently, when the lamp was lit and released it swung gently to and fro in a series of slowly decreasing arcs. Galileo carefully timed the swings with the beats of his pulse, and observed that the time taken for each complete swing was always the same. Even the large swings which the lamp made immediately after it was released took no longer than the small swings which it made just before it came to rest.

Galileo's observations of the swinging lamp made him realise that the time taken by a pendulum to make a complete swing depended not on the size of the arc through which it swings but on the pendulum's length. This idea led him to invent pendulum devices, or *pulsilogia*, with which physicians could measure the rates of their patients' pulses.

Many years later Galileo came back to the pendulum. He used it to turn a train of gear wheels at a constant slow speed, and incorporated this mechanism in his design for a pendulum clock. This was the first such clock ever designed, although Galileo never actually made one himself.



A reconstruction of the mechanism suggested by Galileo for regulating a clock by a pendulum. The teeth of the wheel are inclined towards the pawl (bar at the top)

A TABLE TO SHOW THE OSCILLATIONS PER MINUTE OF PENDULUMS OF VARIOUS LENGTHS

length of pendulum	oscillations per minute
cm 50	42·3
cm 60	38·6
cm 70	35·8
cm 80	33·4
cm 90	31·5
cm 100	29·9

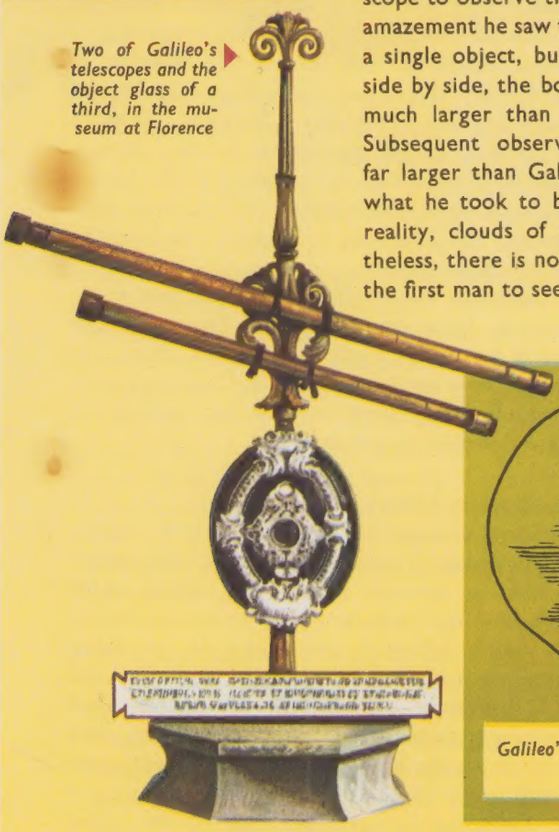
Galileo's astronomy

In 1609 Galileo heard of the telescope, which had been invented a few years previously by a Dutchman, Zacharias Jansen. Immediately, he began to make similar instruments, and in a remarkably short space of time constructed several useful telescopes of his own with which he observed the objects in the night sky.

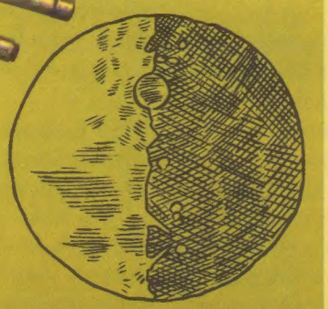
The first object which Galileo observed was the moon, and he quickly saw that, contrary to popular opinion, its surface was not smooth, but was covered with deep depressions and mountain ranges. Then he turned his attention to the planet Jupiter and saw first three, and later four, of this great planet's satellites. Galileo was much in favour at the Tuscan court at that time, and he decided to call Jupiter's satellites the *Medicean Stars* in honour of the four brothers of the ruling family, Cosimo, Francesco, Carlo, and Lorenzo de Medici.

A little later Galileo used his telescope to observe the planet Saturn. To his amazement he saw that it did not consist of a single object, but of three bodies lying side by side, the body in the centre being much larger than the two at the sides. Subsequent observation with telescopes far larger than Galileo's have shown that what he took to be small planets are, in reality, clouds of small particles. Nevertheless, there is no doubt that Galileo was the first man to see Saturn's 'rings'.

wooden channel



Two of Galileo's telescopes and the object glass of a third, in the museum at Florence



Galileo's drawing of the surface of the moon

Galileo and the microscope

Like the telescope, the microscope was also first invented in Holland. Indeed the two instruments have so much in common that the discovery of one was bound to lead quite quickly to the discovery of the other.

One of the new microscopes reached Rome in 1622 as a gift for a cardinal, but, since there were no instructions for its use accompanying the gift, it was necessary to seek the aid of Galileo.

After a little study Galileo not only discerned the manner in which the new instrument worked but he also saw ways in which he could improve on it. Consequently he made a series of microscopes of his own, far better than those imported from abroad.

GALILEO'S WRITINGS

Galileo was a prolific author. He recorded his discoveries in detail and discoursed at length on their importance. Much of his work he described in letters, which he wrote in longhand and distributed among his fellow scientists. One of these letters, written in July 1610, is rather amusing, for it contains this 37-letter anagram: *Smaismrmilmepoetaleumibvnenugttaviras*. Needless to say, nobody managed to solve this impossible puzzle, and when Galileo was asked for a solution five months later he said that it meant *altissimum planetam tergeminum observavi* (I have observed the highest planet in triplet form). His idea was that, having seen what he thought to be three planets forming Saturn, he wished to establish for himself the importance of the discovery. However, being a little unsure of his observations, he also wanted a little more time to work with his telescope in order to make sure that what he saw was true.

Galileo described much of his astronomical work in a book which he called *Siderius Nuncio* (*The Messenger of the Stars*). In it he told of his discovery of the rough surface of the moon, of four of Jupiter's satellites, and of the fact that many of the stars in the sky were not single stars but clusters. It was in this book, too, that Galileo showed how his discoveries supported the views of an earlier astronomer, Copernicus (see page 355), who declared that the earth was not, as everyone thought, at the centre of the Universe. Instead, as Copernicus had said, the earth and the planets were in continuous motion around the sun; and the earth, at least, was also turning on its own axis.

This view, which Galileo further elaborated in his work on sun spots, earned him an informal warning from the Inquisitor. Later he was to get into much more serious trouble with the Inquisition over the text of his most famous book, *The Dialogue*.

The Dialogue is a conversation between three men, two of whom try to convince a third of the correctness of the Copernican view of the Universe. It was suggested to the Pope that the third man was himself; and it is possible that this supposed slur, rather than the controversial views the book contained, was the reason for the book's prohibition and for Galileo's punishment by the Inquisition.

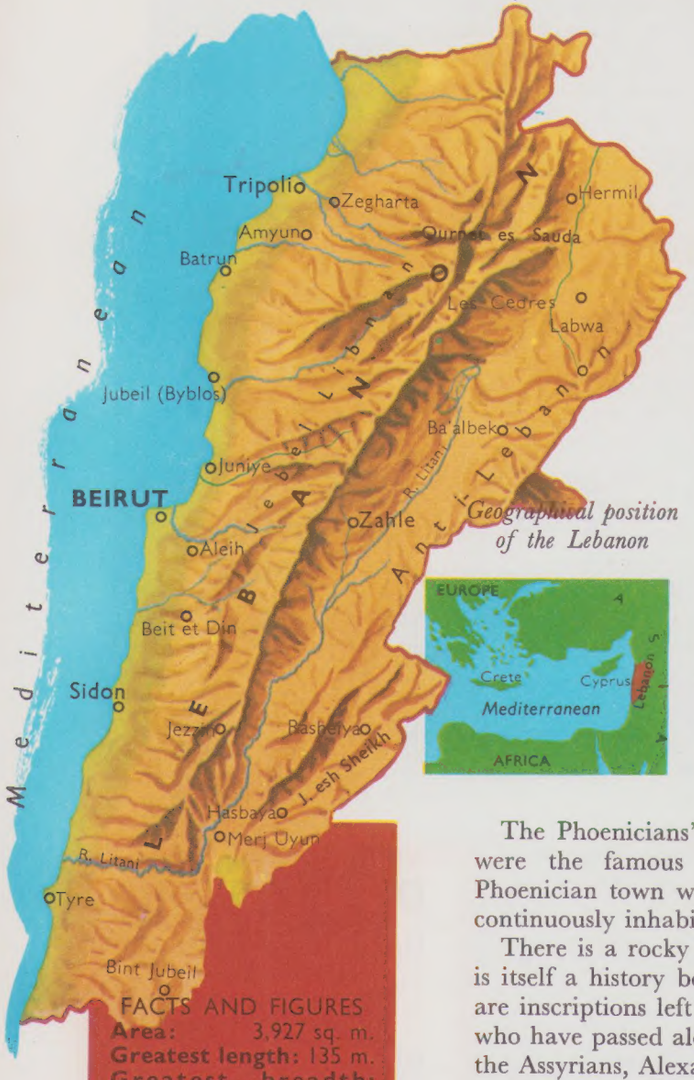
DIALOGO
DI
GALILEO GALILEI LINCEO
MATEMATICO SOPRAORDINARIO
DELLO STVDIO DI PISA.
E Filosofo, e Matematico primario del
SERENISSIMO
GR.DVCA DI TOSCANA.
Doue ne i congressi di quattro giornate si discorre sopra i due
MASSIMI SISTEMI DEL MONDO
TOLEMAICO, E COPERNICANO,
Proponendo indeterminatamente le ragioni Filosofiche, e Naturali tanto per l'vna, quanto per l'altra parte.
CON PRI VILEGI.
IN FIORENZA, Per Gio: Batista Landini MDCXXXII.
CON LICENZA DE' SVPERIORI.

The frontispiece of the first edition of The Dialogue

THE LEBANON

THE Lebanon is a small, mountainous country at the eastern end of the Mediterranean Sea. One might say rather that it is a large mountain – its climate, its beauty, and its history all depend on its shape. Within only 15 miles of the sea the mountains rise to more than 10,000 feet, two-and-a-half times higher than any in the British Isles. As a result of this, it is quite possible to ski on the mountains and swim in the warm sea on the same day. When it snows, Lebanese build snowmen on the bonnets of their cars and then try to get down the hairpin roads to Beirut, the capital, before they melt.

Terraced hillsides, ancient cedar trees, snow-capped mountains under a brilliant sky – this is the Lebanon



Geographical position of the Lebanon

FACTS AND FIGURES

Area: 3,927 sq. m.
Greatest length: 135 m.
Greatest breadth: 35 m.
Population: 1,626,000
Capital: Beirut
Language: Arabic
Religions: Christianity, Islam
Principal imports: cereals, cotton and wool, iron and steel
Principal exports: citrus fruits, onions, textiles, apples and pears

History

The modern Lebanese boast that they are the descendants of the Phoenicians, who flourished there 3,500 years ago (see page 6).

The Phoenicians' main towns in the Lebanon were the famous Tyre and Sidon. Another Phoenician town was Byblos, perhaps the oldest continuously inhabited city in the world.

There is a rocky valley in the Lebanon which is itself a history book; on its smooth rock faces are inscriptions left by almost all the conquerors who have passed along the Mediterranean shore: the Assyrians, Alexander the Great, the Romans, the Arabs, the Crusaders, the Mongols, the Turks, the French of Napoleon's day, and the British General Allenby in 1918.

Although the Lebanese have always been a proud-spirited and independent people, the Lebanon has been an independent country only since the Second World War. From the 16th century to the First World War it formed part of the Ottoman empire, and between the two World Wars it was ruled by the French as a *mandate*, or trust, from the League of Nations.

Religion

The Lebanon is a land of many religious groups. Perhaps because the mountain has always been a place of refuge for persecuted minorities, there are remnants of almost every sect which has existed in the region for the past 2,000 years.

Although the surrounding countries have been predominantly Muslim for a thousand years or more, half the population of Lebanon is still Christian. The Christian community includes Nestorians and Monophysites (who had already been condemned by the rest of the Church as heretics by the 5th century), as well as members of the Catholic and Orthodox Churches. Though almost all of the population speaks Arabic, various sects use for their religious services Greek, Latin, Armenian, Coptic, and Syriac (a language akin to Aramaic, the language of Christ, which is still spoken in a few villages).

The Muslims are similarly divided into sects, and there is also a group known as Druzes, whose religion is so secret that very few of them are allowed to know anything about it. Unfortunately, these groups rarely trust one another and sometimes have serious quarrels.

The Lebanon today

The national emblem of the Lebanon is the cedar, but the mountain is no longer covered with cedars as it was in ancient times. Too many shipbuilders, cabinet makers, and ordinary woodcutters have followed the example of King Solomon when he made himself 'a chariot of the wood of Lebanon'. Today the few cedars that remain are guarded as a national treasure, and some of the trees still standing are over 2,000 years old.

The Lebanon is certainly one of the most beautiful countries in the world, with its mountains, snows, and sea, and, above all, its delightful climate – neither too hot nor too cold. As a result, its coast has become the favourite holiday resort of the Middle East, and this has greatly added to its prosperity – tourism is now the Lebanon's most important industry. Unfortunately, this happy picture is marred by the shocking poverty and disease which still exist in certain parts of the country.

January 1943 – bitter fighting in the streets of Stalingrad as the Russians mercilessly advance against the trapped German army

THE SECOND WORLD WAR (part two)

BY the summer of 1942 the Axis powers – Germany, Italy, and Japan – dominated a major part of the world. In Asia, Japan controlled a huge area of the mainland and the Pacific, which stretched from the frontiers of India to the shores of Australia. In North Africa, Rommel's Germans and Italians seemed poised to take Egypt and expel the Allies from the continent. In Russia, German troops had overrun much of the Ukraine and were threatening Leningrad and Moscow.

But by about the middle of 1942 the Axis powers had reached the limits of their expansion. Great Britain now had the giants, Russia and America, fighting by her side, and it was only a matter of time before the superior resources of the Allies would decisively alter the pattern of the war.

With the Axis in control of so much of Europe, the great strategic question was: where should any major counter-attack take place? As early as December 1941 Mr Churchill and President Roosevelt had decided, at the Washington Conference, to begin the long fight back in North Africa. By the autumn of 1942 the Allied plans were ready.

Rommel's defeat in Africa

The landings were planned to take place in French North Africa on 8th November. Before that date the British 8th Army, under General Montgomery, had launched an attack of its own and had won the first real Allied success of the war. The battle of El Alamein (see page 2424) began on 23rd October. Rommel was driven back, and retreated from Egypt. Montgomery followed, and chased the enemy 1,350 miles in 82 days. He took Tobruk on 12th November, El Agheila on 14th December, and Tripoli on 23rd January. Rommel was forced back on the Mareth Line behind the Tunisian frontier.

By this date the Axis plight in Africa was desperate. Anglo-American forces, landing near Casablanca, Oran, and Algiers on 8th November, had defeated the opposition of those Frenchmen loyal to Vichy (see page 2792). They drove the Germans eastwards as Rommel was being chased west by Montgomery. On 20th March the 8th Army broke the Mareth Line, and early in April made contact with Anglo-Americans pushing eastwards. The Axis forces were trapped in the region of the Bon peninsula. On 7th May Biserta and Tunis both fell, and within a week the Axis armies in North Africa surrendered completely.

Collapse of Italy

Italian morale was destroyed by the African defeat. Superiority in the air had passed to the Allies, who were making increasingly heavy raids on Italian towns. The North African victories had given the Allies the key to controlling the Mediterranean. At the Casablanca Conference (January 1943) Roosevelt and Churchill had already decided to make Italy herself the next objective.

In the early summer of 1943 a number of Mediterranean islands were captured, and in July the invasion of Sicily by Americans, Canadians, and the British 8th Army began. Several towns fell, and on 25th July Mussolini, his reputation shattered, resigned. His successor, Marshal Badoglio, remained at war while secretly negotiating with the Allies. Early in September the Allies landed in south Italy. The Germans, sensing that Badoglio was about to defect, occupied Rome on 10th September and consolidated their

6th June 1944 – Allied troops land along the Normandy beaches and 'D-Day' begins

occupation of most of the country. Mussolini was rescued by the Germans and installed as a puppet leader in northern Italy. Marshal Badoglio fled to the Allies and declared war on Germany. Thus Italy joined the Allies, though most of the country was in German hands.

The Allies captured Naples on 1st October and pressed the Germans slowly and painfully back. Early in the New Year the Garigliano river was crossed, but a landing at Anzio, farther north, was a partial failure. In May a major assault at last resulted in a decisive breakthrough, and on 4th June Rome was captured. Siena and Leghorn (Livorno) were taken by July, and on 13th August Florence was captured.

The Germans fell back on the so-called Gothic Line – from the river Arno to Rimini – but they were forced back. Pisa fell early in September, and Rimini was entered on the 21st. Ravenna was taken on 22nd December, and in the spring of 1945 the final assault began. Attacks from both sides of the Italian peninsula captured Bologna, Spezia, and Genoa. German resistance was at an end. On 28th April Mussolini was seized by Italian patriots in Milan and hanged. On 2nd May the German armies in Italy laid down their arms.

The war in the east

Before the defeat of the Germans in Italy the issue was virtually decided in the other theatres. We saw on page 2790 that the German attempt to take Stalingrad in the summer and autumn of 1942 was beaten off. This marked the turning point of the war in the east. As the Soviet Union summoned her vast resources of man-power from the depths of Asiatic Russia, the colossal German front line was driven back towards Germany. Field-Marshal Von Paulus's 6th Army surrendered in Stalingrad in January 1943. The Germans retreated from the Caucasus. Kursk fell in February, and Rostov and Kharkov were taken. A German counter-attack recaptured Kharkov, but elsewhere along the line the Germans were being pushed back. On 1st January Velikiye Luki, between the two giant German army blocks threatening Leningrad and Moscow respectively, was taken by the Russians. By February the threat to both great cities was over. In July the German offensive in the south was thrown back, and this was followed by a westward movement of the whole southern Russian front.

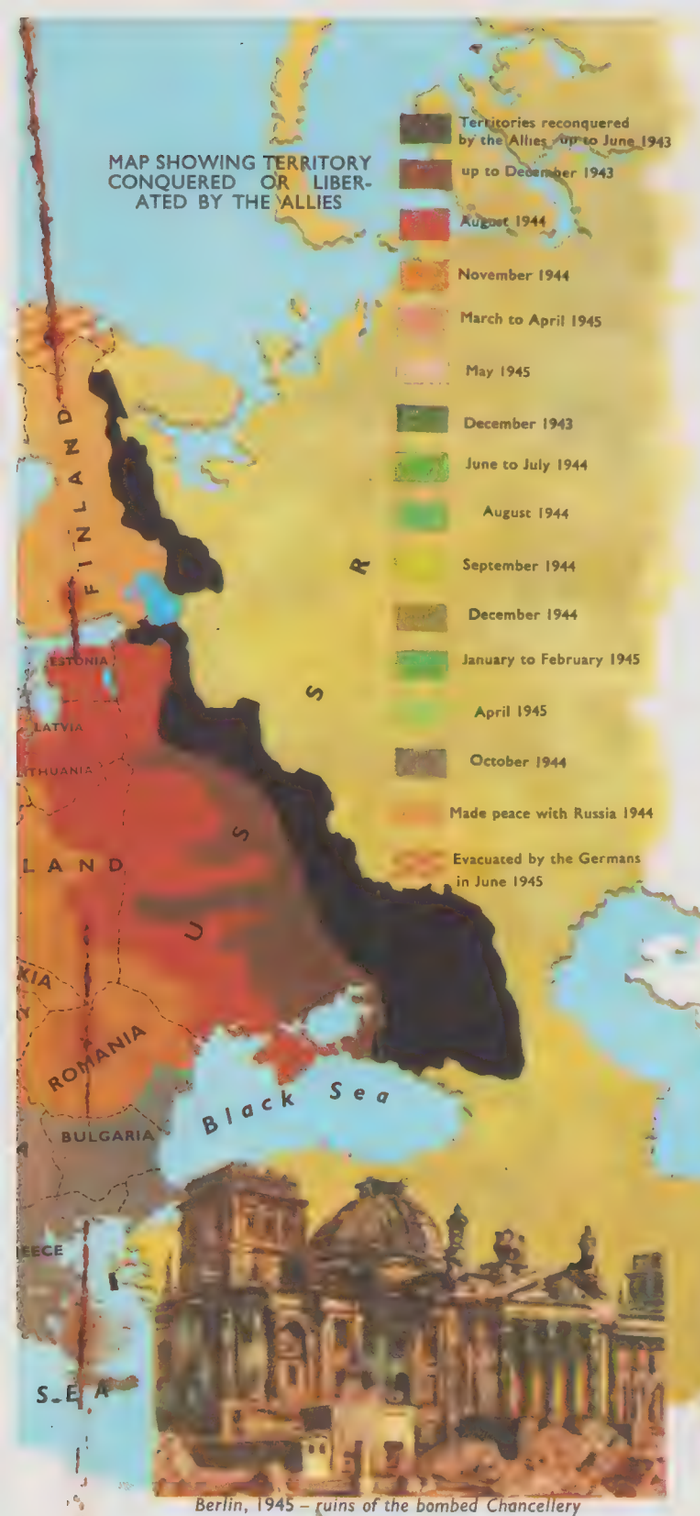
By the end of August Orel, Kharkov, and Taganrog were taken. The Germans fell back to the Dnieper. The Russians broke the line. On 6th November Kiev, the capital of the Ukraine, was recaptured. Meanwhile an attack had developed west of Moscow. It succeeded in liberating Smolensk. In the New Year of 1944 operations were extended to the north. Novgorod was taken and the Germans retreated to the river Narva and into the Baltic provinces. In fact the entire line was in retreat. A spring offensive took the Russians past the rivers Bug, Dniester, and Pruth. On 10th April Odessa was taken. By the late spring the Russians stood on the Estonian frontier in the north, within Poland in the centre, and over the Romanian frontier in the Balkans. They were close to Germany herself.

The V2 rocket, Hitler's secret weapon, developed too late

War comes to Germany

Long before their frontiers were broken the Germans had experienced the worst horrors of war. Allied air-raids had increased since the spring of 1942. On the night of 30th May the R A F devastated Cologne with the first of its thousand-bomber raids. Massive attacks on Essen, Bremen, and Osnabrück followed. In 1943 the Americans began huge daylight raids on industrial and military targets. By the middle of 1944 the Allies had won complete supremacy in the air and at sea, and the Germans turned more and more to their 'secret weapons'. These were jet-propelled flying bombs (V1s) and rocket bombs (V2s). They were terrifying weapons, but were developed too late. The first V1s landed in England on 13th June 1944, and the V2s were first launched on 8th September. But German industrial and military co-ordination was already collapsing, and by the time the V2s landed Allied troops were pressing through France towards the German frontier.

The invasion of western Europe was the crucial operation of the whole war. Had it taken place when the German strongholds in France were too powerful, it could have meant disaster. General Eisenhower, appointed Supreme Commander in December 1943, chose 5th June 1944 for the



Berlin, 1945 – ruins of the bombed Chancellery

day of the invasion. But due to bad weather 'D-Day' did not begin until the 6th. Landings took place along the Normandy beaches, and after five weeks' heavy fighting Caen and Cherbourg, the two key points in Normandy, were captured. The Allies pushed on to Paris. In August they crossed the river Seine, and on the 23rd Paris was liberated from within by French partisans.

Further landings on the French Riviera were successful, and Toulon, Marseilles, Valence, and Lyons were liberated by early September. The same month the Allies, crossing into Belgium, liberated Brussels and Antwerp. By the beginning of October, after more bitter fighting, the Rhine had been reached and Strasbourg taken. American troops, having crossed the German frontier, were pressing on into the Saar.

At the same time as the Allies were advancing on Germany from the west, the Russians made a spectacular advance from the east. In June 1944 they attacked all along the line. Finland was entered in the north, and an advance made into Poland in the centre. Finland surrendered on 19th September, and the Russians pressed on to the frontier of East Prussia. Polish towns, Lublin, Lvov, Brest-Litovsk, fell one after another. The Vistula was reached, though a Polish rising within Warsaw was ruthlessly crushed by the Germans. Meanwhile, in the south, a Balkan offensive began. Romania surrendered and declared war on Germany. Bulgaria and Yugoslavia were reached in the first days of September and promptly deserted Germany. Early in October the Russians crossed the Hungarian frontier, though Hungary did not surrender until January 1945. By this time Greece, too, had been liberated by the British fighting alongside Greek partisans.

The end of the Reich

Germany's plight was desperate. Her resources were negligible compared with those of the Allies. Her industries were crippled by relentless bombing. The troops fought bravely, but direction from the top was now completely lacking. Hitler, in his underground bunker in Berlin, was diseased in body and almost unquestionably insane. He continued to move huge armies on maps. But the maps were out of date and the armies long destroyed. Early in 1945 came an assault along the whole western front. Trier, Cologne, and Coblenz had fallen by the middle of March, and resistance west of the Rhine was virtually finished. Montgomery crossed the lower Rhine, and his troops advanced north and east. By early April the Allies, including the resurgent French, were established east of the Rhine at Wesel, Remagen, and Oppenheim. From these points the very heart of Germany was penetrated, and the story of the war becomes a catalogue of captured German towns and cities.

As Germany was collapsing from the west, the Russians began their final offensive. Warsaw fell early in January, and the Russians swept across Poland at the same time as their forces were moving up the Danube. Vienna was taken in mid-April, and on 16th April the great assault on Berlin began. By 21st April the Russians were fighting in the Berlin suburbs and the western Allies were advancing from the Elbe. Berlin surrendered to the Russians on 2nd May after terrible fighting in the houses and streets. On 30th April Hitler had committed suicide in his bunker. The German people heard to a Wagnerian background of solemn music the announcement that he had died 'fighting at the head of his troops'.

The end of the road had been reached. German armies in north-west Germany, Holland, and Denmark hastened to surrender. Nazi officials, like Himmler and Goering, tried unsuccessfully to make their escape. On 7th May General Jodl signed the surrender. The following day was celebrated as 'V E-Day'.

The war in Japan

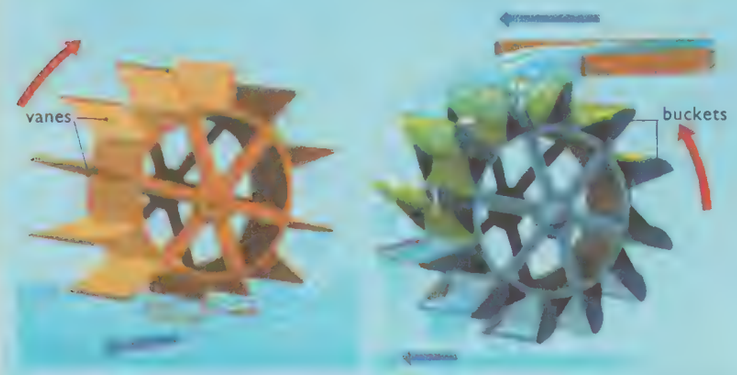
'V E-Day' had come, and 'V J-Day' was near. Despite Japan's fanatical resistance, her great area of conquests dwindled from late 1942 onwards. In 1943 troops, mainly from America, Australia, and New Zealand, began to occupy the smaller Pacific islands. In September 1943 General MacArthur began an offensive in New Guinea. In November the Gilbert Islands were captured, and early in 1944 the Marshall and Admiralty Islands. In June 1945 Okinawa, between Formosa and Japan, was taken, and by 5th July all the Philippines had been liberated.

On the mainland the British had been fighting desperately in Burma throughout 1943. In 1944 Japanese offensives towards India were repulsed, and their troops were thrown back in full flight. Lashio and Mandalay were taken in March 1945 and Rangoon early in May.

In July America, Britain, and China issued from Potsdam a demand for unconditional surrender with the alternative of total destruction. The ultimatum was ignored. On 6th August the first atom bomb was dropped on Hiroshima, causing unspeakable devastation. The casualties are said to have exceeded the entire British air-raid casualties throughout the war. Still Japan did not surrender. On 8th August Russia declared war on Japan and sent troops into Manchuria. On 9th August a second atomic bomb was dropped on Nagasaki. On the 10th the Japanese sued for peace, and on the 14th they accepted the Allied demands. An unconditional surrender was signed on 2nd September.

WATER TURBINES

AT one time many English villages had their own water-mills, standing beside streams, in which the miller ground the farmers' corn to flour. Outside the mill, sometimes at the side, sometimes beneath, turned the water-wheel. Through this device the miller was able to obtain from the stream the power that he needed to turn his millstone.



The two types of water wheel found in English water-mills; the one on the left uses the kinetic energy of the water, that on the right the potential and kinetic energy. (The blue arrows show the direction of flow of the water; the red arrows the direction in which the wheel is rotating)

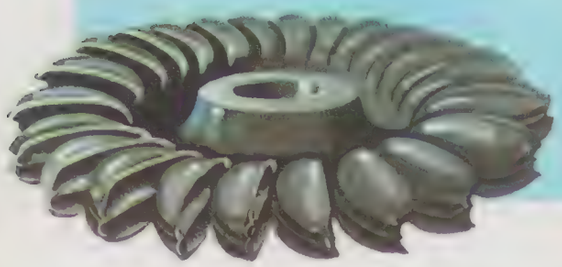
Most English water-mills have wheels like the one in the illustration on the left. The water in the stream pushes on the lowest vanes of the wheel, turning both the wheel and the spindle to which it is attached. It is easy to understand that the amount of power which this type of water-wheel provides depends largely on the *speed* at which the stream is flowing. In engineering language it uses the *kinetic energy* of the water.

The second and less common type of water-wheel is illustrated on the right. In this type the water falls from a height into buckets on the circumference of the wheel. The water weighs each bucket down in turn and thus keeps the wheel turning round. The power which this kind of water-wheel provides depends both on the *height* through which the water falls – in other words, on the *potential energy* of the water – and on the kinetic energy of the water as it hits the bucket.

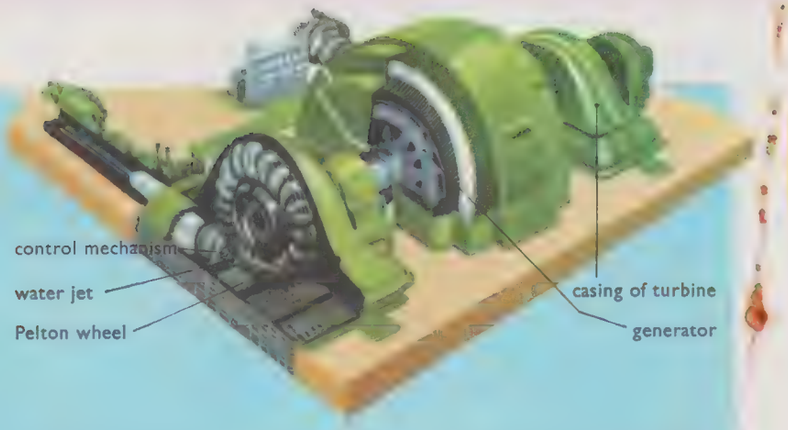
Though the water-mills of English villages have, almost everywhere, fallen into disuse, water is still an important source of power. By means of *water turbines* its energy is harnessed to turn the generators in hydro-electric power stations. Two types of water turbine are used for this purpose. One uses the kinetic energy of water, the other partly kinetic energy and partly pressure.

The impulse turbine

The modern turbines which are operated by the kinetic energy of rapidly moving water are called impulse turbines, and the best known is the Pelton wheel. To work this type of turbine, water is piped down a hillside so that at the lower end of the pipe it emerges from a narrow nozzle as a jet with very high velocity. This jet impinges on small spoon-shaped buckets mounted on the circumference of the turbine wheel, and as it does so it transfers its kinetic energy to the buckets and thus turns the wheel.



The wheel of a Pelton wheel water turbine. Each of the buckets is divided into two by a sharp central ridge



A generator operated by two Pelton wheel water turbines. Part of the casing has been removed to show the mechanism

The Pelton wheel turbine can be controlled by adjusting the flow of water on to the buckets. In order to stop the turbine a valve is used to shut off the water completely. Small adjustments, necessitated by alterations in the load on the generator, are more safely made by a device which deflects part of the water jet away from the buckets.

The chief disadvantage of the Pelton wheel turbine is that it can only operate satisfactorily in situations where it is possible to obtain water flowing at a comparatively high speed. Where this condition can be fulfilled, however, the turbine is efficient and economical, for the volume of water which is required to rotate the wheel is quite small compared with that needed by the reaction or pressure turbine.

The reaction turbine

Of the many types of reaction or pressure turbine in use, that known as the Francis turbine is the most common. In this turbine the wheel is surrounded by a *volute chamber* shaped like an American doughnut, with a hole in its middle. The water which works the turbine runs into this chamber under pressure, and escapes between guide vanes arranged in its inner wall. As the water escapes, its pressure, and also to some extent its kinetic energy, is applied to a series of vanes fixed on the outside of the wheel, and as a result of this pressure the wheel turns. The water escapes from the turbine through the centre of the wheel.

The speed at which the reaction turbine rotates can be controlled by the guide vanes in the inner wall of the volute chamber. These can be pivoted in order to regulate the volume of water reaching the wheel. The reaction or pressure turbine operates best when a large volume of water is available and the water can only fall through a short distance.

HYDRO-ELECTRIC POWER STATIONS

By building a dam across a valley it is often possible to impound a large volume of water which can be used to work a water turbine coupled to a generator. Where the power station is built at a much lower level than the reservoir, the water can be piped downhill to operate Pelton wheels. Where this is not possible, the power station is often built at the base of the dam, and the pressure of water is then used to turn reaction turbines.

HISTORY OF DENMARK

ALONG time ago Denmark was one of the greatest powers in the western world. It was from Danish territory that the fierce Vikings descended on Britain and other parts of Europe; it was against the Danish leader, Guthrum, that King Alfred fought his momentous battles. Danes settled in many parts of Britain, and Scandinavian names, like Grimsby and Whitby, are constant reminders of their settlements.

People have lived in Denmark since the earliest times. Relics of the Stone Age have been found in the Jutland peninsula and the Baltic islands, which make up modern Denmark. The first king to unite these islands was Gorm the Old. His son, Harald Bluetooth (died 985), was Denmark's first Christian king. He conquered Norway, and his son, Sweyn Forkbeard, conquered England in 1013. Sweyn's son, Canute, united an empire consisting not only of Denmark, Norway, and England, but also of southern Sweden.

Statue of a Viking warrior

After Canute's death Danish influence declined, but in the late 12th and early 13th centuries, under the great Valdemar kings, Denmark again established her hegemony (leadership) over northern Europe. She fought with the German states for supremacy in the Baltic, and in 1214 the emperor was forced to acknowledge Danish rule over the German-Slav lands north of the Elbe and Elde. Danish power declined once more in the late 13th and early 14th centuries. The decline was arrested by King Valdemar IV (1340–1375). He established his authority over the whole kingdom and reorganised the nation's finances. But war broke out with the Hanseatic League (see page 2750), and by the peace treaty (1370) Denmark lost many trading privileges.

The Danish flag

The 12th-century Cistercian abbey at Sor, within which many Danish kings are buried

Frederick IX – who became king in 1947

The imposing castle in Copenhagen which is now a magnificent museum

By 1397 Valdemar's daughter, Margaret, had become ruler of Denmark, Sweden, and Norway. In that year, at Kalmar, these countries accepted Eric of Pomerania as her heir.

The 15th century saw a growing conflict between the king and nobles. This culminated in 1523, when the nobles overthrew King Christian II and installed Frederick I. The same year the Kalmar Union was broken by the accession of Gustavus I as the independent king of Sweden. Frederick's successor, Christian III (1534–1559), established Protestantism, which brought an increase in efficiency, and centralisation.

The Swedish wars

The 17th century saw a struggle for power in the north, partly coincident with the Thirty Years War, which ended disastrously for Denmark. By the Treaty of Brömsebro in 1645 she had to surrender Gothland, Oesel, Herjedalen, and Jemtland. In 1658, by the Peace of Roskilde, Denmark temporarily lost Bornholm and Trondheim.

Danish disasters had stemmed largely from her over-privileged nobility. But between 1660 and 1665 a constitutional revolution established an absolute monarchy. There were further costly wars with Sweden (1675–1679, 1700, and 1704–1720), but the late 17th and 18th centuries saw considerable enlightened social legislation. Serfdom was abolished, trade was fostered, and important agricultural reforms were introduced.

During the Napoleonic wars Denmark was attacked by Britain in 1801 and 1807. She suffered heavily in 1814 after Napoleon's defeat: Norway, which had been part of Denmark since 1397, went to Sweden, and Heligoland was surrendered to Britain. The post-war years brought poverty and bankruptcy and growing dissatisfaction with absolute monarchy. In 1848 the king granted a liberal constitution. That same year a war broke out with Prussia for the possession of Schleswig and Holstein. In 1852 Denmark was confirmed as their ruler; but in 1864 Bismarck's Prussia defeated Denmark and the duchies were surrendered.

In 1866 a new constitution was adopted which resulted in a wide cleavage between Right and Left. In the late 19th century a number of progressive measures, like health insurance and old-age pensions, were introduced.

The 20th century

During the First World War Denmark managed to remain neutral. In fact, in 1920 she was able to recover northern Schleswig after a plebiscite. But in April 1940, during the Second World War, Hitler occupied Denmark. The Danes began to sabotage German installations, and Hitler took savage reprisals. In August 1943 martial law was declared. Denmark, far from being a 'model protectorate' (as Hitler had called it), found herself being treated as an enemy.

After the war Denmark joined the United Nations, and though it was against her tradition of neutrality, she also joined the North Atlantic Treaty Organisation.

Denmark lost Iceland, which became independent in 1945, and several years of unemployment and hardship followed the war. But after 1948 Marshall Aid helped economic recovery, which was rapid. In 1953 there was a further alteration to the constitution. Today Denmark, under King Frederick IX, enjoys a high standard of living and a liberal constitution.

Mongolia

IF you wanted to describe a country as being 'at the ends of the earth', you might find that Mongolia was the best candidate for this title. To the north lies eastern Siberia; to the east Manchuria; to the south-east the Gobi desert; and to the south-west the remote Sinkiang province of China. Mongolia is 6,500 miles from New York; 4,400 miles from London; and 2,900 miles from Moscow.

As well as being one of the most remote, it is also one of the most underdeveloped countries in the world. Its population is around 1 million – about a third of that of the Irish Republic – yet its total area (615,000 square miles) is about 10 times the size of England and Wales. Livestock outnumber human beings by 25 to 1. Only 15 per cent of the people live in towns. The second largest town has a population of less than 15,000. There are only just over 5,000 miles of roads, and less than 1,000 miles of railway track in the whole country. But, curiously enough, this primitive republic is the relic of one of the mightiest empires in the history of the world.

Map and flag of Mongolia, and (inset) its geographical position

The great central plain of Mongolia

Much of Mongolia consists of a great plateau between 3,000 and 4,000 feet high. The north-west is mountainous and divided by rivers. The highest point is Tabun Bogdo (15,266 feet) in the Altai mountains. The soil is poor, and only in the wetter north is agriculture possible. In the north are found the snow leopard, wolf, marmot, and ermine. The Gobi desert is the home of the wild camel, wild horse, and wild ass. Temperatures range from an average of 60°F in July to −5°F in January; the precipitation ranges from 10 to 14 inches a year in the north-west to 1 or 2 in the south-east.

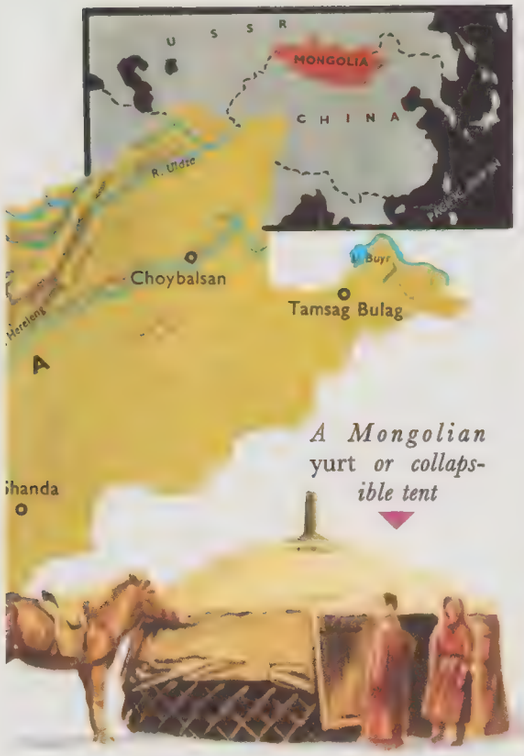
The expression 'Mongolia' is usually used to describe the Mongolian People's Republic. But, in fact, there are two quite separate Mongolias: Outer Mongolia (the Mongolian People's Republic) and Inner Mongolia, which is an autonomous region of the Chinese People's Republic. Inner Mongolia is about the same size as Outer Mongolia, but has about nine times the population.

The Mongolian People's Republic, although theoretically independent, is very much a satellite of the Soviet Union. Its people (see page 1410) belong to the Mongoloid race, the world's second largest racial group after the Caucasians. They have straight black hair, oval faces, and almond-shaped eyes. A large proportion are herdsmen (*arats*), roaming the great Mongolian plain – a vast, empty region with few proper roads. They make their living from the sheep, goats, and cattle which accompany them. Many have no home except the famous *yurts*, or round tents, which can be pulled down when the flocks have to move. Today, however, the Communist government is making an attempt to end the nomadic life which these herdsmen have lived for centuries.

ECONOMY

The Mongols are still, on the whole, a nation of herdsmen. They have the highest proportion of sheep and goats per head in the world. There are roughly 20 sheep or goats to each person. In fact there are 14·2 million sheep, 5·3 million goats, 2·3 million horses, 2·3 million cattle, and 900,000 camels. Because of the Mongolian tradition that breaking the soil annoys the spirits, for centuries the Mongolians did not cultivate the land. In 1947 only 75,000 acres were under cultivation. Today, however, this is being changed. There is quite extensive cereal growing in the

There are over 2 million cattle in Mongolia



History

In the 13th century, under the great Mongolian Khans, the Mongolian empire stretched from the Pacific to Europe (see page 1044). But the empire soon declined. The Mongols were expelled from China, and in the 17th century Mongolia actually became a Chinese province. In 1911 there was a revolution, and the independent state of Outer Mongolia was set up under the Living Buddha. Between 1919 and 1921 China managed to regain Mongolia. But since the Bolshevik Revolution in 1917 Communist influence had been growing. In 1921 a romantic young cavalryman, Sukhe Bator, overthrew the existing government. A year later Sukhe Bator was poisoned. But under the friendly protection of the Russian government Communism established itself in Mongolia. In 1945 China formally recognised Mongolia as an independent republic. In 1961 Mongolia entered the United Nations. Her political significance today lies in her position as a 'buffer' between the two great and unfriendly Communist giants – China and the Soviet Union.

Towns

The vast majority of the population does not live in towns. The only city of any size in Mongolia is Ulan Bator (population 180,000), which was founded in 1649 and became the home of the Living Buddha, spiritual ruler of Mongolia. It has a university with 2,500 students, an Academy of Science, a modern hospital, a sports stadium, many factories, and even a Grand Hotel. It is connected by air with Irkutsk and Ulan Ude in Siberia, and Peking in China. It is also connected by rail to the Trans-Siberian Railway and to the main line with Peking.

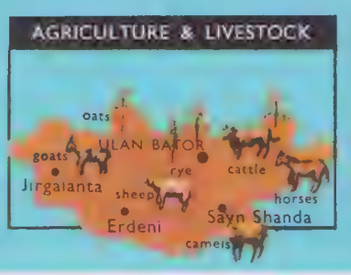
GOVERNMENT AND ADMINISTRATION

Mongolia is today a Communist country, but it is not always easy to apply the principles of Communism to a nation of herdsmen. A system in which private property and trade are forbidden tends to clash with the possessive feeling of a herdsman towards the goats and sheep which accompany him on his travels. However, the government has decreed that each herdsman must belong to a co-operative or *negdel*. Much of their stock is held in common with other members of the negdel, but a certain amount of private ownership is allowed. The negdel provides a headquarters from which its members are administered and in which they can receive an elementary education and medical attention. Elementary education is now compulsory, and there are 419 elementary and secondary schools, 15 technical institutes, and 4 institutes of higher education. The Mongolian alphabet is no longer taught; since 1949 the Russian alphabet has been used. Literacy is low in Mongolia: the combined circulation of all its newspapers and magazines is only 280,000. The country is governed by a Presidium of 7 members. Power is, in theory, vested in the Great People's Khural, the equivalent of the Russian Supreme Soviet, or the British Parliament, and the country is divided into 18 administrative divisions known as *aimaks*.

Ulan Bator: the House of the Great Khural

north, and over 30 state farms have been established.

Most of the industry is found in the east and south-east. The extent of Mongolia's mineral wealth is not yet certain. Oil is produced in the Gobi. Coal is mined in the east. The target for coal production for 1965 is 1·3 million tons. Tungsten and uranium are said to be exported to the Soviet Union. In Ulan Bator there are quite a few industries, including textiles.



Facts and figures

Area: 615,000 square miles
Length: (west–east) 1,480 miles
Width: (north–south) 780 miles
Highest point: Tabun Bogdo, Altai Mts., 15,266 feet
Population: 1,000,000
Capital: Ulan Bator (population about 180,000)
Currency: 1 *tughrik* = 100 *mongo*
Religion: Buddhist Lamaism

SOUTH AMERICA: communications

SOUTH AMERICA is a continent in which communications are particularly difficult. For thousands of miles along the west coast the Andes rise to over 10,000 feet. In Peru and Bolivia they consist of a coastal and an interior range separated by a high plateau, the Altiplano, which has for centuries provided a north-south route. But the steep flanks of the mountains are deeply scored by ravines filled by raging torrents, while the higher parts are covered by glaciers. As there are few low passes, the Andes form an effective barrier to east-west communications.

The plateau of Brazil is fronted by a steep scarp, clothed with dense tropical forest, which hinders penetration of the interior. Communications are also difficult in most of the lowlands, for the basins of the Amazon, Orinoco, and Paraná-Paraguay rivers are covered in almost impenetrable forest and contain extensive areas of swamp. These, with the unpleasant tropical climate and the insects and snakes of the jungles, discourage settlement and make roads and railways difficult to build and expensive to maintain.

One of the paddle steamers which are a common sight on the Amazon

AIR TRANSPORT

Air transport in South America is rapidly increasing in importance and is helping to overcome the difficulties facing land communications. Because of the great distances between centres of population, it is ideally suited to South America, which is connected by a number of flights with the United States, Central America, and Europe. Rio de Janeiro, Montevideo, Buenos Aires, and Lima have become major international centres of air transport.

More important than international flights, however, are the internal services which connect all the continent's main towns and also serve isolated settlements. Most aeroplanes carry passengers, mail, newsprint, and light, relatively valuable, goods; but some heavy articles – for example, machinery – are also transported. Most of the republics are 'air-minded', especially Brazil and Colombia. Air travel has done much to unify the latter country, while the whole of Brazil is served by a network of flights.

RAILWAYS

Vast areas of South America are not served by railways – for example, they are almost completely absent in the Amazon basin and only slightly developed on the Brazilian plateau. Few lines cross the Andes, and some countries have no rail links with their neighbours.

The construction of railways (and indeed of roads) is hindered by the steep slopes of the Andes and the plateau edges, the heavy rainfall of many areas, and the dry heat of the Atacama Desert. These factors also increase maintenance costs; landslides, for example, are a common occurrence where heavy rains lubricate the soil on steep slopes. Broad rivers, subject to violent floods, constitute a serious problem for the bridge builder.

On the whole, the railways developed in haphazard fashion, stretching inland from the coastal ports. Consequently there are many different gauges, and this has hindered international co-operation. Nevertheless, the number of links between countries has increased since the last war. Chile, Argentina, Uruguay, Brazil, Paraguay, Bolivia, and Peru are now connected by rail, though some of the journeys are difficult.

The Valparaiso–Buenos Aires line involves two changes of gauge and a climb to 10,500 feet to cross the Andes, while the Asunción–Buenos Aires line is interrupted by two ferry-crossings.

The Callao–Lima–Oroya line – the highest in the world. It reaches a height of 15,865 feet

Another Trans-Andean line is that connecting Antofagasta with Salta and the Argentine system. This was completed only in 1946, and is important for the transport of fertilisers from the Atacama Desert to the farmlands of the pampas, and for the carrying of cotton westwards. It is a very much quicker and cheaper means of transport than the old sea-route round the Straits of Magellan.

Gauges even vary within individual countries. The heavy coffee exports of São Paulo State, for example, have to be transferred from the metre-gauge tracks of the plantations to the broader-gauge lines going to Santos and Rio de Janeiro. The transport demands of this great coffee-producing area have led to the relatively extensive growth of railways there, but the densest network occurs on the flat pampas of the Argentine. Construction was easy here, and during the late 19th century a system centred on Buenos Aires rapidly expanded, to cater for the export of beef, wheat, and maize.

RIVERS

Although South America contains some of the greatest rivers in the world, they have not developed into major highways of commerce. This is because their basins drain densely-forested lands that have been little settled, and because their courses are often hindered by navigational hazards. The Amazon is about 3,900 miles long, and ocean-going vessels of 14-foot draft can go 2,300 miles upstream to Iquitos in Peru, while large ships can reach Manaos. Navigation on its tributaries, however, is hindered by waterfalls above their confluence with the Amazon. The most common river craft are the rather battered steamers which serve the small settlements and trading posts, located chiefly at river junctions.

The Paraná-Paraguay system is used to a limited extent for bringing products from the interior, but navigation is difficult because of shifting channels, sandbanks, shallows, and dangerous floods, while the La Guayra and Iguazu falls block the upper Paraná. The lower Orinoco is used, in conjunction with roads and railways, for the export of iron ore from Venezuela, while the Magdalena is important in the transport network of Colombia.

ROADS

Roads are playing an increasing part in the opening of underdeveloped areas, especially in Brazil, where there has been considerable state investment in trunk roads. Major highways now link the once-isolated *llanos* (plains) of Venezuela with the country's main cities. The development of Peru's lands in the Amazon basin is being carried out by a system of roads across the Andes. The Cochachimba–Santa Cruz Highway has led to the increased exploitation of Bolivia's tropical lowlands.

The most important road in South America is undoubtedly the Pan-American Highway, which links all the continent's main cities. It starts at Caracas in Venezuela and goes through Bogotá, Quito, and Lima to Santiago; from here it climbs up over the Andes and descends to Buenos Aires and Montevideo, before continuing to Rio de Janeiro. Other sections serve La Paz and Asunción. When construction work in certain central American republics is completed it will be linked, via Mexico, with the United States.

ST THOMAS AQUINAS

ST THOMAS AQUINAS is, perhaps, the most venerated of all mediaeval thinkers – indeed, of all philosophers. For, in a sense, his doctrines are official texts of the Catholic Church, and Catholic theologians accept 'Thomist' philosophy as a basis for their studies.

Yet, in his lifetime, Thomas was far from being the pillar of orthodoxy he has since become. Indeed, he was a controversial figure. His ideas were condemned by several notable churchmen, among them Etienne Tempier, Bishop of Paris, who condemned certain theses, and Robert Kilwardby and John Peckham, both Archbishops of Canterbury.

A great thinker

St Thomas was born in Sicily in 1225. He belonged to a distinguished Lombard-Norman family, which was prominent in the service of the Emperor Frederick II. He grew into a large man, with an amiable disposition. He was educated at the Abbey School of Monte Cassino, and then at the University of Naples, where he was taught by Peter the Irishman and Martin of Denmark.

It was much against the wishes of his family that Thomas decided to join the Dominicans, a relatively new order of Friars (see page 2678). He was sent to Cologne to continue his philosophical studies, and in 1252 was appointed a lecturer in Paris, where he gained a great reputation. In 1259 he was appointed theological adviser and lecturer to the Papal court. Ten years later he was summoned once more to Paris, to defend the Dominicans from certain detractors, and also to combat 'Averroism'. The great Islamic thinker, Averroës (see page 2193), had taught that 'reason' must ultimately give way before 'revelation' where the two conflict. Thomas believed 'right reason' and revelation never conflicted.

In 1272 Thomas became director of the Naples *studium*, and in 1274 he died on his way to attend a Church Council at Lyons.

His philosophy

The Church owes an enormous debt to St Thomas. His immense learning and scholarship provided the answer to a problem which threatened to disrupt the harmony among the Church's intellectuals. This problem was the 'rediscovery' of Aristotle in the 13th century. Until the 13th century Aristotle's philosophy and political theory had been generally unknown in western Europe. But as knowledge of Greek spread and Aristotle was more widely read, theologians found themselves faced with the fact that Aristotle seemed able to provide a rational basis for everything. His theories could not only do without Christianity but often seemed to conflict with it.

St Thomas Aquinas – harmonised reason and revelation

Reason and revelation

What, then, of revealed Truth? Conservative churchmen thought if reason conflicted with revelation, then reason was wrong. Radicals began to suspect that reason could prove that revelation was false. St Thomas's supreme achievement, embodied in his *Summa Theologica* (1266–1273), was that he combined, or synthesised, these two apparent opposites. He set out to prove that reason, coming from God, was good, and therefore could not err if properly used. In fact, it could only lead towards Truth. But reason by itself was incomplete because of the limitations of the human mind. Man needed revealed Truth to explain certain things which he could not explain by reason, and also to guide his reason along correct lines. For example, reason could tell him that all 'effects' need an immediate preceding 'cause'; and therefore man can work out the so-called 'chain of causation'. This is working towards Truth. Revelation completes the chain by explaining that God is the origin and 'Prime Mover', who has no cause but Himself, and with whom the 'causal chain' begins and ends.

In short, Aristotle had stated that knowledge could come from reason and that perfection could be reached in human terms. Aquinas added to this by saying that this was all right as far as it went, but that there were other terms besides human terms which supplemented, but did not conflict with, Aristotelian philosophy.

Political theories

Like Aristotle, Thomas applied his theories to the laws of states, and is, therefore, an important political theorist. He did not say that God's laws were right and human laws wrong. Instead he tried to harmonise them. He said that there were four sources of law which did not conflict with one another. There was **Human Law,** in which man made laws in accordance with **Natural Law.** Thus self-preservation was natural, so man made the law that murder was wrong. Human Law, properly made, could not conflict with Natural Law, so that it would be wrong to enact that murder was right.

Above Natural Law was **Eternal Law.** Natural Law works in accordance with God's own righteousness. A Law of Nature, like self-preservation, reflects God's own goodness and justice because it is in harmony with Eternal Law.

Above everything comes the Word of God itself, **Divine Law** or Revelation. If the laws of the state are constructed according to all these laws, they will be just and good in God's eyes, and those who obey them will be pleasing to both the civil authorities and to God.

St Thomas was canonised in 1323. He was declared a doctor of the Church by Pius V in 1567. His doctrines were officially approved in two papal encyclicals, by Leo XIII in 1879, and by Pius XI in 1923.

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Roland, Madame (1754–1793)
O liberty! O liberty! what crimes are committed in thy name! Lamartine, *Histoire des Girondins.*

Roosevelt, Franklin Delano (1882–1945)
I pledge you – I pledge myself – to a new deal for the American people. *Speech*, 1932.

Rousseau, Jean Jacques (1712–1778)

Man is born free, and everywhere he is in chains.
Du Contrat Social.

'Saki' (Hector Hugh Munro; 1870–1916)
The cook was a good cook, as cooks go; and as cooks go she went. *Reginald.*
Women and elephants never forget an injury. *Ib.*

Scott, Sir Walter (1771–1832)
Come open the West Port, and let me gang free,
And it's room for the bonnets of Bonny Dundee!
Bonny Dundee.
O, young Lochinvar is come out of the west,
Through all the wide Border his steed was the best.
Marmion.
O Woman! in our hours of ease,
Uncertain, coy, and hard to please. *Ib.*

Selden, John (1584–1654)
Preachers say, Do as I say, not as I do. *Table Talk.*

Shacklock, Richard (c. 1575)
Proud as peacocks. *Hatchet of Heresies.*

Shadwell, Thomas (1642?–1692)
'Tis the way of all flesh. *The Sullen Lovers.*

Shakespeare, William (1564–1616)
My salad days,
When I was green in judgment.
Cleopatra, Antony and Cleopatra Act I, Scene v
The barge she sat in, like a burnish'd throne,
Burn'd on the water. [Of Cleopatra.] *Ib.* II. ii.
Age cannot wither her, nor custom stale
Her infinite variety. *Ib.*
I have
Immortal longings in me. *Cleopatra, Ib.* V. ii.
Sweet are the uses of adversity,
Which like the toad, ugly and venomous,
Wears yet a precious jewel in his head.
The Duke, As You like It I. ii.
And thereby hangs a tale.
Touchstone, quoted by Jacques. Ib. II. vii.
All the world's a stage,
And all the men and women merely players:
They have their exits and their entrances. *Jacques, Ib.*
It was a lover and his lass,
With a hey, and a ho, and a hey nonino. *Ib.* V. iii.
Hark! hark! the lark at heaven's gate sings,
And Phoebus 'gins arise. *Cymbeline* II. iii.
I have not slept one wink. *Pisanio, Ib.* III. iv.
A countenance more in sorrow than in anger.
Horatio, Hamlet I. ii.
Something is rotten in the state of Denmark.
Marcellus, Ib. iv.
There are more things in heaven and earth, Horatio,
Than are dreamt of in your philosophy. *Hamlet, Ib.* v.
The time is out of joint; O cursed spite,
That ever I was born to set it right! *Ib.*
Brevity is the soul of wit. *Polonius, Ib.* II. ii.
Though this be madness, yet there is method in it. *Ib.*
There is nothing either good or bad, but thinking makes it so. *Hamlet, Ib.*
The play's the thing
Wherein I'll catch the conscience of the king. *Ib.*
To be, or not to be: that is the question:
Whether 'tis nobler in the mind to suffer
The slings and arrows of outrageous fortune,
Or to take arms against a sea of troubles,
And by opposing end them? *Ib.* III. i.
Thus conscience doth make cowards of us all. *Ib.*
The lady doth protest too much, methinks.
The Queen, Ib. ii.
I must be cruel, only to be kind. *Hamlet, Ib.* iv.
For 'tis the sport to have the engineer
Hoist with his own petard. *Ib.*
There's such divinity doth hedge a king,
That treason can but peep to what it would.
King, Ib. IV. v.
Alas! poor Yorick. I knew him, Horatio; a fellow of infinite jest, of most excellent fancy. *Hamlet, Ib.* V. i.
There's a divinity that shapes our ends,
Rough-hew them how we will. *Ib.* ii.
The better part of valour is discretion.
Falstaff, King Henry IV Part I V. iv.
I see you stand like greyhounds in the slips,
Straining upon the start. *Ib.*
Beware the ides of March. *Soothsayer, Julius Caesar* I. ii.
Et tu, Brute! *Julius Caesar, Ib.* III. i.
Friends, Romans, countrymen, lend me your ears;
I come to bury Caesar, not to praise him.
Mark Antony, Ib. ii.
This was the most unkindest cut of all. *Ib.*
There is a tide in the affairs of men,
Which, taken at the flood, leads on to fortune.
Brutus, Ib. IV. iii.
This was the noblest Roman of them all . . .
His life was gentle, and the elements
So mix'd in him that Nature might stand up
And say to all the world, 'This was a man!' [Of Brutus.]
Antony, Ib. V. v.
As flies to wanton boys, are we to the gods;
They kill us for their sport. *Gloster, King Lear* IV. i.
The wheel is come full circle. *Edmund, Ib.* V. iii.
If it were done when 'tis done, then 'twere well
It were done quickly. *Macbeth, Macbeth* I. vii.
Is this a dagger which I see before me,
The handle toward my hand? *Ib.* II. i.
Stand not upon the order of your going,
But go at once. *Lady Macbeth, Ib.* III. iv.
Double, double toil and trouble;
Fire burn, and cauldron bubble. *Witches, Ib.* IV. i.
Out, damned spot! out, I say! *Lady Macbeth, Ib.* V. i.
To-morrow, and to-morrow, and to-morrow,
Creeps in this petty pace from day to day,
To the last syllable of recorded time;
And all our yesterdays have lighted fools
The way to dusty death. Out, out, brief candle!
Life's but a walking shadow, a poor player,
That struts and frets his hour upon the stage,
And then is heard no more; it is a tale
Told by an idiot, full of sound and fury,
Signifying nothing. *Macbeth, Ib.* v.
I bear a charmed life. *Ib.* vii.
It is a wise father that knows his own child.
Gobbo, Merchant of Venice II. ii.
The quality of mercy is not strained;
It droppeth as the gentle rain from heaven
Upon the place beneath. *Portia, Ib.* IV. i.
Take then thy bond, take thou thy pound of flesh. *Ib.*
Marry, this is the short and the long of it.
Mistress Quickly, Merry Wives of Windsor II. ii.
Ill met by moonlight, proud Titania.
Oberon, Midsummer Night's Dream II. ii.
But I will wear my heart upon my sleeve
For daws to peck at. *Iago, Othello* I. i.
This royal throne of kings, this scepter'd isle,
This earth of majesty, this seat of Mars,
This other Eden, demi-paradise,
This fortress, built by nature for herself
Against infection and the hand of war,
This happy breed of men, this little world,
This precious stone set in the silver sea . . .
This blessed plot, this earth, this realm, this England.
Gaunt, King Richard II II. i.
For God's sake, let us sit upon the ground
And tell sad stories of the death of kings.
King Richard, Ib. III. ii.
Now is the winter of our discontent
Made glorious summer by this sun of York.
Gloster, King Richard III I. i.
This weak piping time of peace. *Ib.*
Was ever woman in this humour woo'd?
Was ever woman in this humour won? *Gloster, Ib.* ii.
A horse! a horse! my kingdom for a horse!
King Richard, Ib. V. iv.
Conscience is but a word that cowards use. *Ib.* iii.
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O Romeo, Romeo! wherefore art thou Romeo?
Juliet, Ib. II. ii.
What's in a name? that which we call a rose
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Parting is such sweet sorrow. *Ib.*
We are such stuff
As dreams are made on, and our little life
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O brave new world,
That has such people in 't. *Miranda, Ib.* V. i.
Where the bee sucks, there suck I;
In a cowslip's bell I lie. *Ariel, Ib.*
If music be the food of love, play on,
Give me excess of it. *The Duke, Twelfth Night* I. i.
Some are born great; some achieve greatness, and some have greatness thrust upon them.
Letter to Malvolio, Ib. II. v.
Exit, pursued by a bear.
Stage direction, The Winter's Tale III. iii.
Shall I compare thee to a summer's day?
Thou art more lovely and more temperate:
Rough winds do shake the darling buds of May,
And summer's lease hath all too short a date.
Sonnet XVIII.

Shaw, George Bernard (1856–1950)
When a stupid man is doing something he is ashamed of, he always declares that it is his duty.
Caesar and Cleopatra.
The greatest of evils and the worst of crimes is poverty.
Major Barbara, Preface.
An Englishman thinks he is moral when he is only uncomfortable. *Man and Superman.*
He who can, does. He who cannot, teaches.
Maxims for Revolutionists.

Shelley, Percy Bysshe (1792–1822)
Let there be light! said Liberty,
And like sunrise from the sea,
Athens arose! *Hellas.*
O wild West Wind, thou breath of Autumn's being.
Ode to the West Wind.

Sidney, Sir Philip (1554–1586)
Thy necessity is yet greater than mine.
On giving his water-bottle to a dying soldier.

Sophocles (495–406 B C)
Wonders are many, and none is more wonderful than man. *Antigone.*

Spenser, Edmund (1552?–1599)
A cruel crafty Crocodile,
Which in false grief hiding his harmful guile,
Doth weep full sore, and sheddeth tender tears.
The Faerie Queene.

Southey, Robert (1774–1843)
You are old, Father William, the young man cried.
The Old Man's Comforts, and how he Gained them.

Spencer, Herbert (1820–1903)
This survival of the fittest. *Principles of Biology.*

Stevenson, Robert Louis (1850–1894)
Fifteen men on the dead man's chest
Yo-ho-ho and a bottle of rum!
Drink and the devil had done for the rest –
Yo-ho-ho and a bottle of rum! *Treasure Island.*

Swift, Jonathan (1667–1745)
I cannot but conclude the bulk of your natives to be the most pernicious race of little odious vermin that nature ever suffered to crawl upon the surface of the earth. *Gulliver's Travels. Brobdingnag.*
I know Sir John will go, though he was sure it would rain cats and dogs. *Polite Conversation.*
All the world and his wife. *Ib.*
Hail, fellow, well met. *My Lady's Lamentation.*

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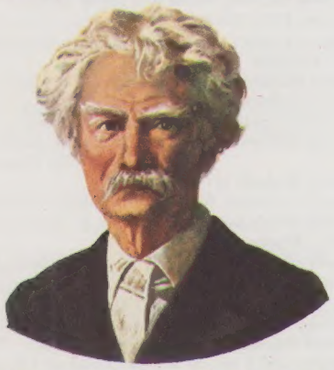
Twain, Mark (Samuel Langhorne Clemens; 1835–1910)



This poor little one-horse town. *The Undertaker's Chat.*
The report of my death was an exaggeration.
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Virgil (70–19 B C)
Arma virumque cano . . . (Arms I sing, and the man . . .)
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Queen Victoria (1819–1901)
We are not amused. *Notebooks of a Spinster Lady.*
He [Mr Gladstone] speaks to Me as if I was a public meeting. G. W. E. Russell, *Collections and Recollections.*

Voltaire (1694–1778)

All is for the best in the best of possible worlds. *Candide.*
The best is the enemy of the good.
Dict. Philosophique, art. *Art Dramatique.*
This agglomeration which was called and which still calls itself the Holy Roman Empire was neither holy, nor Roman, nor an empire.
Essai sur les Moeurs et l'Esprit des Nations.
It is said that God is always for the big battalions.
Lettres. A. M. Le Riche, 1770.

Wallace, Lew (1827–1905)
Beauty is altogether in the eye of the beholder.
The Prince of India.

Walpole, Sir Robert (1676–1745)
They now *ring* the bells, but they will soon *wring* their hands. [On the declaration of war with Spain.]
W. Coxe, *Memoirs of Sir Robert Walpole.*
All those men have their price. *Ib.*
The balance of power.
Speech in the House of Commons, 13th Feb. 1741.

Washington, George (1732–1799)
Father, I cannot tell a lie, I did it with my little hatchet.
Attr.

Wellesley, Arthur, Duke of Wellington (1769–1852)
The battle of Waterloo was won in the playing fields of Eton. *Attr.*
Up Guards and at them again. *Attr.*
Publish and be damned. *Attr.*

Wilcox, Ella Wheeler (1855–1919)
Laugh and the world laughs with you;
Weep, and you weep alone. *Solitude.*

Wilde, Oscar (1854–1900)

In married life three is company and two none.
The Importance of Being Earnest.
Yet each man kills the thing he loves,
By each let this be heard,
Some do it with a bitter look,
Some with a flattering word.
The coward does it with a kiss,
The brave man with a sword!
The Ballad of Reading Gaol.
Please do not shoot the pianist. He is doing his best.
Impressions of America, Leadville.
There is no sin except stupidity. *The Critic as Artist.*
There is only one thing in the world worse than being talked about, and that is not being talked about.
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The English country gentleman galloping after a fox – the unspeakable in full pursuit of the uneatable.
A Woman of No Importance.
I have nothing to declare except my genius.
At the New York Custom House.

Wilson, Thomas Woodrow (1856–1924)
The world must be made safe for democracy.
Address to Congress, 2nd Apr. 1917.

Wolsey, Cardinal Thomas (1475?–1530)
Father Abbot, I am come to lay my bones amongst you.
Cavendish, *Negotiations of Thomas Woolsey.*
Had I but served God as diligently as I have served the King, he would not have given me over in my gray hairs. *Ib.*

Wordsworth, William (1770–1850)

Not in entire forgetfulness,
And not in utter nakedness,
But trailing clouds of glory do we come
From God, who is our home.
Ode, Intimations of Immortality.
I wandered lonely as a cloud
That floats on high o'er vales and hills,
When all at once I saw a crowd,
A host, of golden daffodils.
I Wandered Lonely as a Cloud.
I travelled among unknown men
In lands beyond the sea;
Nor, England! did I know till then
What love I bore to thee.
I Travelled among Unknown Men.
Milton! thou shouldst be living at this hour:
England hath need of thee; she is a fen
Of stagnant waters.
National Independence and Liberty.
My heart leaps up when I behold
A rainbow in the sky. *My Heart Leaps Up.*
The Child is father of the Man. *Ib.*
We murder to dissect. *The Tables Turned.*
For I have learned
To look on nature, not as in the hour
Of thoughtless youth; but hearing often-times
The still, sad music of humanity.
Lines composed a few miles above Tintern Abbey.

Yeats, William Butler (1865–1939)
I will arise and go now, and go to Innisfree,
And a small cabin build there, of clay and wattles made:
Nine bean-rows will I have there, a hive for the honey-bee;
And live alone in the bee-loud glade.
The Lake Isle of Innisfree.